# A REVISION OF THE C. MACULATA SPECIES GROUP OF CONURA SPINOLA IN AMERICA, NORTH OF MEXICO, AND A NEW SPECIES OF THE C. IMMACULATA SPECIES GROUP OF CONURA (HYMENOPTERA: CHALCIDIDAE) 

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#### Abstract

A taxonomic study is made of the C. maculata species group of the genus Conura Spinola from America, North of Mexico. Extensive collections of mostly undetermined Chalcididae from throughout the United States, and type specimens are examined. Conura pilosipartis NEW SPECIES, and C. igneopatruelis NEW SPECIES are described. Conura clora (Burks) NEW STATUS is removed from synonymy with C. erythrina (Walker), and C. clora (Burks) NEW SYNONYMY is synonymized under C. enocki (Ashmead). Host, distributional records and a key to the species of the $C$. maculata species group from America, North of Mexico, is presented. Conura dentiscapa NEW SPECIES, of the C. immaculata species group, is described.


Key Words. - Insecta, Hymenoptera, Chalcididae, Conura, C. maculata species group, systematics

In his revision of the Chalcid-flies of North America, Burks (1940), for convenience, created five species groups for the genus Spilochalcis Thompson. Although acknowledging neotropical specimens often showed intergrades, Burks did find the groupings to be useful when considering North American specimens. Indeed during an examination of thousands of specimens from North America, intermediates were rare. Delvare (1988) later designated new groupings of the species based upon a more complete knowledge of the genus that he gained by extensive studies of neotropical species. At that time Delvare created the C. mariae species group from several members of Burks's (1940) C. femorata species group. Later, Delvare (1992) redesignated the C. mariae species group as the C. maculata species group, citing the male pedicel ventral area of pilosity as the derived state of the species group. In addition, Delvare synonymized Spilochalcis Thompson under Conura Spinola. Therefore, this designation of the genus will be used here.

Comparing Burks's (1940) characterization of the C. femorata species group in his key with statements from Delvare's (1992) diagnosis of the C. maculata species group, it is apparent that all the C. maculata species group members formerly would have been placed within Burks's old C. femorata species group. This can be seen in the following comparison of the characterization for the C. femorata species group (outside of parentheses) in Burks's key and statements from Delvare's diagnosis of the C. maculata species group (in parentheses and italics): "Apex of mesoscutellum not bidentate" ("frenal carina not developed into flange or sublateral lobes"); "right mandible always with three teeth" ("mandibles 2-3, exceptionally 3-3"); "frontogenal suture present" ("malar sulcus generally narrow"); "antennal sockets always dorsad of ventral margins of compound eyes" ("antennae slightly to distinctly inserted above lower eye margin"); "antennal scape long, apex at least reaching level of vertex, usually markedly exceeding level of

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Figure 1. Male antennal structures of Conura spp. Scape in mesal and frontal views, $48 \times$. Pedicel in mesal view, $48 \times$. A. Conura acragae, scape. B. Conura dentiscapa, scape. C. Conura enocki, scape. D. Conura igneoides, scape and pedicel. E. Conura igneopatruelis, scape and pedicel. F. Conura mariae, scape and pedicel. G. Conura phais, scape. H. Conura pilosipartis, scape.
vertex" ("scape long, always exceeding vertex"); "abdomen not compressed" ("female gaster at least as long as thorax").

Although all of the newer species assigned to the C. maculata species group would have formerly been placed within the older C. femorata species group, the latter is much broader than Delvare's and contains members of Delvare's $C$. immaculata, C. femorata, and C. maculata species groups. Refer to Delvare (1992) for complete discussion of synapomorphies and a complete diagnosis of the $C$. maculata species group.

The only available keys for North American species of these groups were those of Burks (1940). Identifying many specimens of Burks's C. femorata species group was impossible using his key; key characters were often variable, difficult to interpret, and a number of phenons could not be confidently placed in any of the described species (J. Halstead, personal communication). While using Burks's key, males of Conura mariae (Riley), C. phais (Burks), and C. clora (Burks) would frequently key differently than females. Intraspecific variation of these females precludes resolution here; however, interspecific distinctness of male antennal scapes in the $C$. maculata species group, resolves many problems.

## Methods

Character Measurement and Terminology. - Terminology used here follows Torre-Bueno (1985) and Bucher (1948). The interocular space is measured frontally at the level of the ventral margin of the median ocellus. The measurement of the malar space follows Burks (1940: fig. 7a). Comparative measurements of the petiole in dorsal aspect are not done here; instead, the petiole is measured laterally with the length defined by the apex of the propodeum and the abdominal articulation points, and the height is defined by the maximum lateral height. The flange angle of the petiole is determined as the deviation of the ventral margin, posteriorly, from the dorsal margin, when viewed laterally.

Depositories. - Where hundreds of specimens have been examined, not all label data is cited. However, the depositories of specimens from a given location are indicated in an abbreviated form in the materials examined section. Specimen depositories, and their abbreviations are: Louisiana State University, Baton Rouge, Louisiana (LSU); North Carolina State University, Raleigh, North Carolina (NCSU); Snow Entomological Museum, University of Kansas, Lawrence, Kansas (UK); University of California, Riverside, California (UCR); the collection of H. A. Hespenheide, Los Angles (Hesp); Utah State University, Logan, Utah (USU); University of Arizona, Tucson, Arizona (UA); California Academy of Sciences, San Francisco, California (CAS); American Museum of Natural History, New York, New York (AMNH); Mississippi Entomological Museum, Mississippi State University (MSU); University of Georgia Museum of Natural History, Athens, Georgia (UG); Los Angeles County Museum of Natural History, Los Angeles, California (LACM); Florida Collection of Arthropods, Florida State Department of Agriculture, Gainesville, Florida (FDA); California State Collection of Arthropods, California Department of Food and Agriculture, Sacramento, California (CDFA).

## Conura maculata Species Group <br> Conura acragae Delvare

(Figs. 1A; 2A; 3A)
Conura acragae Delvare, 1993 ("1992"): 365.
Diagnosis. - Sharing basic color, structural, and textural patterns, C. pilosipartis Moitoza, NEW SPECIES and C. acragae Delvare appear very closely related. Refer to the C. pilosipartis diagnosis for a general discussion of their differences and similarities.

Discussion. - Gerard Delvare has examined the specimens that this discussion


Figure 2. Female heads of Conura spp., frontal view, $28 \times$. A. Conura acragae. B. Conura dentiscapa. C. Conura enocki. D. Conura igneoides. E. Conura igneopatruelis. F. Conura mariae. G. Conura phais. H. Conura pilosipartis.
is based on, and has identified them as C. acragae. I have not examined the holotype of this species, and rely upon Delvare's judgment.

Material Examined.-TEXAS. HIDALGO Co.: Bentsen Rio Grande State Park, 1976, C. Porter, 1 female (FDA); same except 25 Nov 1977, 1 female (TAM); McAllen Valley Botanical Garden, 1974 \& 1986, C. Porter, 5 males, 6 females (FDA); same except 6 Jan 1981, 1 male, (TAM); same except 28 Dec 1975, 1 male (TAM); same except 12 Jan 1979, 1 female (TAM).


Figure 3. Stigma of forewing of Conura spp., $65 \times$. A. Conura acragae. B. Conura pilosipartis.

## Conura enocki (Ashmead)

(Figs. 1C; 2C)

## Spilochalcis enocki Ashmead, 1904: 439. <br> Spilochalcis clora Burks, 1940: 306. NEW STATUS, NEW SYNONYMY.

Diagnosis. - In C. erythrina (Walker 1860), under which Burks (1979) synonymized C. clora, the carinulae of the frontal parietals radiating from the lateral sides of the median ocellus are nearly lateral and do not curve ventrally to or toward the level of the antennal sockets before expiring as in C. enocki. Also, C. erythrina possesses a small mesal metafemoral tooth (that may be overlooked in the holotype, because the metafemora are glued, with the inside surface down, to a card) whereas C. enocki possesses none. The posterolateral propodeal projection in C. erythrina is very robust, but it is reduced in C. enocki. The bifurcated apical areas of the stigma of C. erythrina are unequal in length (similar to Fig. 3A), but they are equal in length in C. enocki (similar to Fig. 3B). An important similarity that these two species share is a relatively unmodified male antennal scape.

Because of the similarity between C. enocki, C. phais, and C. mariae positive determinations, particularly of females, can be difficult. Conura enocki females generally possess the fewest black markings of these three species. The metacoxa, parapsides, postscutum, propodeum, metafemur, gaster, and scrobe cavity have no (or much reduced) black markings. The interocellar space is equal to $2.0 \times$ the diameter of a lateral ocellus, contrasting the C. mariae value of 1.3 , and the C. phais value of 1.5 diameters. A petiole 1.5 (or more) $\times$ as long as high can also aid in distinguishing females of C. enocki from C. phais ( 1 to $1.25 \times$ as long as high) and C. mariae ( 0.8 to $0.9 \times$ as long as high).

The males, in contrast to the females, of $C$. enocki can easily be distinguished from males of $C$. mariae and C. phais by their distinctive antennal scape. Male and female antennal scapes in C. enocki are the same. The apical area of the scape lacks the mesal margin incision, and is without appreciable enlargement or excavation. Finally, the lateral apex of the scape is not protruded to an angle, but is rounded (Fig. 1C).

Discussion. - Burks (1940) overlooked C. enocki (Ashmead) and described C. clora instead. Later Burks (1979) synonomized C. clora with C. erythrina.

Upon examination of the type specimens I found that $C$. clora NEW STATUS and C. erythrina were not synonymous, and further, that $C$. clora NEW SYNONYMY was synonymous with C. enocki. Conura erythrina is a different species, which I have not observed from north of Mexico.

Further changes in C. enocki nomenclature may be forthcoming. A prior name,
possibly resulting in additional synonomy, is being studied (G. Delvare, personal communication).

Material Examined.-ARIZONA. CHOCHISE Co.: $8.1 \mathrm{~km}(5 \mathrm{mi}) \mathrm{W}$ of Portal, $1646 \mathrm{~m}(5400 \mathrm{ft})$ (AMNH). PIMA Co.: Tucson (UA). CALIFORNIA. SAN DIEGO Co.: San Diego (CDFA). FLORIDA. ALACHUA Co.: Gainesville (FDA, LACM). DARE Co.: (FDA). GADSDEN Co.: (FDA). HIGHLANDS Co.: (FDA). HENDRY Co.: Labelle (UK). INDIAN RIVER Co.: (UK). JACKSON Co.: Compass Lake (UK). LEON Co.: Tall Timbers Research Station (FDA). LEVY Co.: Cedar Keys (UK). MARION Co.: (FDA). PUTNAM Co.: Putnam (FDA). VOLUSIA Co.: Volusia (FDA). HARDEE Co.: Zolfo Springs (UK). GEORGIA. TALBOT Co.: Prattsburg (UK). KANSAS. CHEROKEE Co.: (UK). DOUGLAS Co.: Lawrence (UK). LOUISIANA. E BATON ROUGE PARISH: Baton Rouge (LSU). MISSISSIPPI. OKTIBBEHA Co.: Mississippi State University (MSU). NORTH CAROLINA. DORE Co.: Southern Pines (AMNH). PENDER Co.: Holly Shelter (NCSU). WAKE Co.: Raleigh (NCSU). OKLAHOMA. BRYAN Co.: Bennington (OSU). CADDO Co.: (OSU). CREEK Co.: (OSU). KINGFISHER Co.: (OSU); Dover (OSU). LATIMER Co.: (OSU). LINCOLN Co.: (OSU). MCCURTAIN Co.: Wright City (OSU). NOBLE Co.: (OSU). PAYNE Co.: (OSU). STEPHENS Co.: (OSU). TULSA Co.: Bixby (OSU). WASHITA Co.: (OSU); Cordell (OSU). SOUTH CAROLINA. CHARLESTON Co.: Mt Pleasant (UK). TEXAS. ANDERSON Co.: Salmon (TAM). BEXAR Co.: San Antonio (OSU). BRAZOS Co.: College Station (UG, TAM, LACM). HIDALGO Co.: Bentsen Rio Grande State Park (FDA, TAM); McAllen Valley Botanical Garden (FDA, TAM); Santa Ana Wildlife Refuge (TAM) LIVE OAK Co.: (TAM). MADISON Co.: (UK). MCMULLEN Co.: (UG). UVALDE Co.: Uvalde (CDFA). WILLIAMSON Co.: Round Rock (TAM). Examined 66 males, 399 females

> Conura igneoides (Kirby)
> (Figs. 1D; 2D)

Smicra igneoides Kirby, 1883: 71.
Diagnosis. - The females of C. igneoides, C. mariae, C. phais, and C. enocki are all very similar in general appearance and in many particular characters. All four species, for example, have strong carinae on the mesoscutum, and similar black markings. There are, however, reliable characters for separating C. igneoides from the others.

The carinulae radiating from the lateral margins of the median ocellus are nearly lateral, terminating near the margin of the compound eye in C. igneoides (Fig. 2D), rather than radiating obliquely to, or toward, the level of the antennal sockets, as in C. enocki, C. mariae, and C. phais (Figs. 2C; 2F; 2G). There is a small obtuse ventromedial tooth on the metafemur of C. igneoides; however, it is absent in $C$. mariae, C. phais, and C. enocki. Finally, the lateral propodeal projections are tooth-like and fairly long on C. igneoides, while in C. mariae, C. phais, and C. enocki they are fairly short and blunt.

[^1]Co.: (FDA). LEON Co.: (FDA); Tall Timbers Res Sta (FDA). LEVY Co.: Cedar Key (FDA). MARION Co.: (FDA). MONROE Co.: Big Pine Key (FDA). NASSAU Co.: Hilliard (UK). OKALOOSA Co.: (FDA). PASCO Co.: Hudson (UK); Lacoochee (UK). PUTNAM Co.: Crescent City (CAS). SUWANNEE Co.: (FDA). VOLUSIA Co.: Deland (UK). WAKULLAH Co.: Wakullah (FDA, UK). GEORGIA. CLARK Co.: (UG); Athens (UG). COOK Co.: Adel (UK). DOUGHERTY Co.: Putney (UG). RICHMOND Co.: Augusta (LACM); Fort Gordon (CDFA, LACM). ROCKDALE Co.: (UG). WARE Co.: Okefenokee Swamp (UK). INDIANA. COUNTY UNKNOWN: McAlester (AMNH). LOUISIANA. BOURBON Co.: (UK); Corbin (LSU). MASSACHUSETTS. BARNSTABLE Co.: Woods Hole (AMNH, CAS). NEVADA. HUMBOLDT Co.: Winnemucca (USU). NEW JERSEY. BURLINGTON Co.: Browns Mills (AMNH). NEW MEXICO. GRANT Co.: (USU). SIERRA Co.: (CAS). NEW YORK. SUFFOLK Co.: Kalbfleisch Field Station, Huntington (AMNH). NORTH CAROLINA. CUMBERLAND Co.: (CAS). DARE Co.: Kill Devil Hills (NCSU). HYDE Co.: (NCSU). ONSLOW Co.: (NCSU). RUTHERFORD Co.: Morrow Mt State Park (NCSU). WAKE Co.: 11.3 km ( 7 mi ) SW of Raleigh (NCSU). OKLAHOMA. BRYAN Co.: Bennington (OSU). CADDO Co.: (OSU). CARTER Co.: (OSU). CHEROKEE Co.: Gruber Wildlife Management Area (OSU). CREEK Co.: (OSU); Kellyville (OSU). GARFIELD Co.: (OSU). HUGHES Co.: Holdenville (OSU). LATIMER Co.: (FDA). LINCOLN Co.: (OSU); near Tyron (OSU). LOGAN Co.: (OSU). MCCURTAIN Co.: Wright City (OSU, USU). OSAGE Co.: (OSU). PAYNE Co.: OSU, on cotton and pasture (OSU); Lake Carl Blackwell (OSU); Ripley (OSU); Stillwater (OSU). LE FLORE Co.: Poteau (OSU). STEPHENS Co.: (OSU). TILLMAN Co.: Grandfield (OSU). TULSA Co.: (OSU). SOUTH DAKOTA. WASHABAUGH Co.: Badlands National Park (AMNH). TEXAS. ANDERSON Co.: Salmon (TAM). BANDERA Co.: Lost Maples State Park (TAM). BASTROP Co.: Bastrop (CAS). BOSQUE Co.: (TAM). BRAZOS Co.: (LSU, TAM); College Station (TAM). BURLESON Co.: (TAM). CAMERON Co.: (TAM, UK); Brownsville (AMNH, UK); San Benito (UK). COLEMAN Co.: (TAM). COMAL Co.: New Braunfols (CAS). ERATH Co.: (TAM); Bluff Dale (TAM). FRIO Co.: (TAM). GOLIAD Co.: Goliad (UK). GONZALES Co.: Palmetto State Park (TAM). HIDALGO Co.: Bentsen Rio Grande State Park (CAS, FDA, TAM); Donna (TAM); McAllen Valley Botanical Garden (FDA, TAM). KIMBLE Co.: Junction (CAS). KLEGBERG Co.: (CAS); Rivera Beach (UG). MEDINA Co.: Castroville (TAM). SAN PATRICIO Co.: (CAS, CDFA, FDA); Sinton (UK). UVALDE Co.: Rio Frio River (FDA); Uvalde, Speir Ranch (CDFA). WALKER Co.: Ellis Prison (TAM). WELLS Co.: (UCR). WILLIAMSON Co.: Taylor (TAM). UTAH. EMERY $C o .: 4.9 \mathrm{~km}(3 \mathrm{mi})$ NE of Little Gilson, 1555 km ( 5100 ft ) (USU). JUAB Co.: Topaz Mountain (USU). UNITAH Co.: SW of Bonanza, $1555 \mathrm{~km}(5100 \mathrm{ft}$ ) (USU); Ouray (USU). WASHINGTON Co.: Crystal Creek (USU); Leeds (USU); Paradise (USU); S of Pintura (USU); Rockville (USU); Zion National Park (USU). VIRGINIA. PRINCE WILLIAM Co.: (CAS). COUNTY UNKNOWN: Lauray (NCSU). Examined 241 males, 403 females.

## Conura igneopatruelis Moitoza, NEW SPECIES <br> (Figs. 1E; 2E)

Types. - HOLOTYPE (female): TEXAS. HIDALGO Co.: McAllen Valley Botanical Garden, 12-21 Jan 1974, C. C. Porter. ALLOTYPE (male): Same except 1976. Holotype and Allotype deposited in the U.S. National Museum of Natural History, Washington, D.C.

[^2]frontogenal suture slightly curved; malar space $0.25 \times$ height of compound eye; gena, posterior parietals smooth, shiny with silver setae; frons, frontal parietals, vertex with short red-brown setae. Thorax. Pronotum anterior margin with small lateral and dorsal lamina, except dorsomedial 0.33 , posterior dorsal margin carinate on medial 0.5; mesoscutum, parapsides with strong transverse carinae, posterior carinae on parapsides at 45 degree angle, between carinae smooth, shiny, with short, sparse, redbrown, reclined setae; scutellum with setose punctures, setae longer, sparse, erect, red-brown; mesoepimeron mostly smooth, shiny, punctured on dorsal edge only; metaepisternum with sparse, long, erect, silver setae, dorsal 0.66 smooth, shiny, irregularly punctured on ventral 0.33 ; metacoxa dorsolateral surface glabrous; metafemur smooth, with short silver setae, ventrolateral margin with numerous short teeth, ventromedial tooth small, obtuse; apex of stigma concave. Abdomen. Propodeum with lateral, medial, and apical carinae forming irregular polygonal shapes, few long silver setae protruding at posterior and lateral margins; propodeal carinae posterolaterally expanded forming small tooth-like lateral projection on either side of petiole attachment; petiole mostly smooth, shiny, $1.6 \times$ longer than high, lateral carinae lacking, basal lamina short, narrowed dorsolaterally, flange angle nearly vertical; gaster acuminate, mostly smooth, $1.5 \times$ longer than metafemur.
Male (allotype). - Body length. 4.0 mm . Color. Stripe on frontogenal suture, ventral stripe on mandibles, black; mesopleural furrow, ventral stripe of metacoxa, dark brown. Head. Antennal scape with 0.2 of length exceeding vertex, apex broadened and frontally excavated, apical lateral margin rounded, apical mesal margin deeply incised; pedicel nearly $2.0 \times$ longer than segment 4 , abruptly broadened shortly beyond base (Fig. 1E). Abdomen. Petiole $2.0 \times$ longer than high, mostly smooth and shiny, lateral carinae lacking; gaster equal in length to metafemur.

Diagnosis. - Sharing tooth-like lateral propodeal projections, a small ventromedial tooth on the metafemur, a transversely carinate mesoscutum, and lateral carinulae projecting from the lateral margins of the median ocellus (Fig. 2E), C. igneopatruelis and C. igneoides are closely related. The lack of black markings and the mostly smooth and shiny metaepisternum distinguishes female C. igneopatruelis from C. igneoides, but the distinctively shaped pedicel and the lateral apical margin of the antennal scape not protruding to a sharp angle distinguishes the male (Fig. 1E).

Etymology. - Igneo is taken from C. igneoides. Patruelis is taken from the latin word meaning cousin. Together, igneopatruelis is used to describe the apparent relationship between the two species.

Material Examined.-ARIZONA. COCHISE Co.: Chiricahua Mts, Cave Creek Canyon, 1555 m ( 5100 ft ), 2 Jun 1982, H. A. Hespenheide, 1 female, (Hesp). FLORIDA. LEON Co.: Tall Timbers Research Station, Harris, 1 female, (FDA). TEXAS. CAMERON Co.: Brownsville, Jun 1938, R. H. Beamer, 1 male (UK). FRIO Co.: 7 Jun 1972, E. Grissell \& J. Smith, 1 male (TAM). HIDALGO Co.: Bentsen Rio Grande State Park, C. Porter, 3 males, 23 females (FDA); same except 1980, 1981, 1983, 1 male, 11 females (TAM); same except 15 Dec 1983, J. B. Wolley \& H. Browning, 1 female (TAM); McAllen Valley Botanical Garden, 1973-1976, C. Porter, 31 males, 75 females, (FDA); same except 1975, 1977, 1978, 1979, 7 males, 15 females (TAM). Examined 46 males, 137 females.

## Conura mariae (Riley)

(Figs. 1F; 2F)
Chalcis maria Riley, 1870: 101-102.
Diagnosis. - Conura mariae, C. phais, and C. enocki are very closely related, morphologically similar, and difficult to distinguish (especially females). Of these three species, females of C. mariae are decorated with the most numerous and heaviest black markings. The metacoxa of $C$. mariae usually has a dorsolateral black stripe extending from the base to the apex; whereas, C. phais usually has only a spot, and C. enocki usually has no markings. The scape of C. mariae will exceed the level of the vertex by at least 0.2 its entire length, compared to 0.1 for
C. phais and C. enocki. Conura mariae also possesses the longest gaster of these species, usually 1.6 to $2.0 \times$ longer than the metafemur, while the gasters of both C. phais and C. enocki are only $1.4 \times$ longer than the metafemur. Although all the above characters distinguish the females of these three species, they are not always present in every population; males in series are required for definitive determination.
Conura mariae males uniquely possess a distinctive triangular-shaped antennal pedicel. Additionally, the antennal scape is broadened at the apex, and the mesal margin is deeply notched or incised, and the lateral margin is protruded to an acute angle at the apex, and finally, it is frontally deeply excavated (Fig. 1F).
Refer to the C. igneoides diagnosis section for characters to separate C. igneoides from these three species. Several populations of C. igneoides can be, and have been, confused with these other three species.

[^3]
## Conura phais (Burks)

(Figs. 1G; 2G)
Spilochalcis phais Burks, 1940: 307.
Diagnosis. - Conura mariae, C. phais, and C. enocki females are nearly identical; see the diagnosis of $C$. mariae for comments on separating these females. Males
of C. mariae, C. phais, and C. enocki are more easily distinguished than the females. The pedicel of $C$. phais is cylindrical, rather than triangular as in $C$. mariae. The antennal scape of C. phais is greatly enlarged and excavated at the apex (Fig. 1G); however, the medial margin is sinuous rather than deeply notched or incised, but the apical lateral margin is rounded rather than protruded to a point as in C. mariae (Fig. 1F).

Material Examined.-ARIZONA. COCHISE Co.: (USU). NAVAJO Co.: $22.5 \mathrm{~km}(14 \mathrm{mi}) \mathrm{S}$ of Show Low (UA). PIMA Co.: (CAS, LACM). CALIFORNIA. BUTTE Co.: Chico (CDFA). COLUSA Co.: Colusa, 30 Jul 1934, Cerura sp. pupa, 6 males (CDFA). INYO Co.: $8 \mathrm{~km}(5 \mathrm{mi})$ NW of Independence (CAS). MENDOCINO Co.: (LACM). MERCED Co.: $24 \mathrm{~km}(15 \mathrm{mi}) \mathrm{W}$ of Los Banos, San Luis Reservoir (CDFA, TAM); Winton (CDFA). PLACER Co.: Lincoln (CDFA). RIVERSIDE Co.: (UCR); Bautista Canyon (FDA). SAN DIEGO Co.: (CDFA); La Mesa (UCR). SAN JOAQUIN Co.: Weston (CAS). STANISLAUS Co.: Turlock (LACM). FLORIDA. ALACHUA Co.: Gainesville (FDA). HIGHLANDS Co.: Archbold Biological Station (FDA). MARION Co.: (FDA). SUWANNEE Co.: (FDA). GEORGIA. CLARKE Co.: Athens (UG). MISSISSIPPI. PONTOTOC Co.: (MSU). NEW MEXICO. HIDALGO Co.: Rodeo, $1250 \mathrm{~km}(4100 \mathrm{ft})$ (LACM). NORTH CAROLINA. ONSLOW Co.: Onslo (USU). OKLAHOMA. CREEK Co.: $2.4 \mathrm{~km}(1.5 \mathrm{mi})$ NE of Kellyville (OSU). TEXAS. ANDERSON Co.: Salmon (TAM). BELL Co.: Belton (TAM). BRAZOS Co.: (TAM). CAMERON Co.: Brownsville (UCR). ERATH Co.: (TAM). HIDALGO Co.: (TAM); Bentsen Rio Grande State Park (FDA); McAllen Valley Botanical Garden (FDA). WILLIAMSON Co.: Taylor (TAM). UTAH. DAVIS Co.: (USU). GARFIELD Co.: (USU). WASHINGTON Co.: Beaver Dam (USU); Zion Natl Park (USU). Examined 51 males, 75 females.

> Conura pilosipartis Moitoza, NEW SPECIES
> (Figs. $1 \mathrm{H} ; 2 \mathrm{H} ; 3 \mathrm{H}$ )

Types.-HOLOTYPE (female): TEXAS. HIDALGO Co.: McAllen Valley Botanical Garden, 28 Nov 1981, C. Porter. ALLOTYPE (male): same except, 23 Nov 1983. Holotype and allotype deposited in the U.S. National Museum of Natural History, Washington, D.C.


#### Abstract

Description.-Female (holotype). Body length. 6.0 mm . Color. Yellow and brown-orange, with black and brown; most of head, coxa, trochanter, femur, tibia, of fore and mid legs, mesopleuron, posteroventral area of postscutum, ventrolateral area of scutellum, propodeum, yellow; antennal scape, area surrounding ocelli, most of pronotum, mesoscutum, parapsides, dorsal area of postscutum, medial area of scutellum, metaepisternum, metacoxa, metafemur, metatibia, all tarsi, metanotum, venter of petiole, brown-orange; spots on scrobe cavity, mandibular teeth, occiput, anterior transverse stripe on mesoscutum, mesal longitudinal stripe on mesoscutum, transscutal suture, scutoscutellar suture, small anterior dorsal spot or stripe and distal spot on scutellum, most of mesosternum, mesopleural furrow, metaepisternum apical margin, ventromesal stripe on metafemur, ventrolateral metafemoral teeth, arcuate ventrolateral stripe on metatibia, spot ventrad of propodeal spiracular slit, ovipositor sheaths, black; antennal flagella, pretarsi, spot around stigma, gaster, brown; wings cinerous. Head. Antennal scape with 0.15 of length exceeding vertex; interocellar space mesally depressed, $2.0 \times$ diameter of lateral ocellus; vertex with irregular transverse carinulae and with erect, sparse, short, redbrown setae; frontal parietal ventrad of lateral ocellus with carinulae radiating from lateral side of median ocellus straight, nearly lateral, terminating near margin of compound eye, not curving ventrally to level of antennal socket (Fig. 2H); scrobe cavity shallow, smooth, with marginal carinae ventrad and laterad of antennal sockets; interantennal projection with a strong anterior carina; interocular space at level of ventral margin of median ocellus $2.0 \times$ maximum frontal width of compound eye; frons below antennal sockets and laterad of scrobe cavity smooth, with short, sparse, red-brown setae; frontotentorial pit located midway between antennal socket and margin of compound eye and dorsad of ventral margin of antennal socket; frontogenal suture straight; malar space $0.33 \times$ height of compound eye; gena, posterior parietals, smooth, shiny, with silver setae; frons, frontal parietals, vertex, with long red-brown setae. Thorax. Pronotum anterior margin with broad lateral and dorsal lamina, except on dorsomedial 0.33, posterior dorsal margin carinate on mesal 0.5 ; pronotum, mesoscutum,


parapsides, scutellum, dorsal area of postscutum with deep, broad, setose punctures, and red-brown setae (setae of scutellum longer, erect); mesoepimeron mostly smooth, shiny, punctured on dorsal edge only; metaepisternum with long, silver setae, with dorsum slightly protruded, with anterior deeply and densely punctured, with posterior smooth, shiny; metacoxa dorsolateral surface glabrous, with remainder smooth, shiny, with long light and dark setae; metafemur smooth, shiny, covered with short, dark setae, with ventrolateral short teeth, with ventromedial tooth lacking; apex of stigma concave, bifurcations equal in length (Fig. 3B). Abdomen. Propodeum with lateral, medial, and apical carinae forming irregular polygonal shapes, few long silver setae protruding at posterior and lateral margins; propodeal carinae posterolaterally expanded forming small tooth-like lateral projection on either side of petiole attachment; petiole mostly smooth, $2.0 \times$ longer than high, with faint lateral carinae, with long, perpendicular, silver setae protruding laterally from lateral carinae; with basal lamina $3.0 \times$ longer ventrally than dorsally, flange angle nearly vertical; gaster fusiform, $1.1 \times$ as long as metafemur, with dorsum mostly smooth.
Male (allotype). - Body length. 5.5 mm . Color. Ventrolateral spot on metacoxa, transverse stripe on proximal margin of propodeum, black. Head. Antennal scape with 0.15 of length exceeding vertex, apex broadened and frontally excavated, apical lateral margin rounded, (Fig. 1H), apical mesal margin sinuous. Abdomen. Petiole $2.0 \times$ longer than high; gaster equal in length to metafemur.

Diagnosis. - Sharing basic color, structural, and textural patterns, C. pilosipartis and C. acragae appear very closely related. No other species in the C. maculata species group possesses both straight lateral carinulae radiating from the lateral sides of the median ocellus (Fig. 2 H ) and a metafemora without ventromedial teeth. These two species can be readily distinguished by their propodeal projections, stigmas (Figs. 3A, 3B), gaster lengths and forms (females only), petiole basal laminae, and the relative hirsuteness of their petioles (see key characters).

Etymology. - From the Latin word pilosipartis, meaning hairy part or portion. The name describes the long, lateral, perpendicular setae of the petiole.

Material Examined.—ARIZONA. PIMA Co.: Tucson, Jul 1941, L. P. Wehrle, 1 male (UA). TEXAS. HIDALGO Co.: Bentsen Rio Grande State Park, 25 Nov 1978, \& 18 Mar 1981, \& 24 Aug 1983, C. Porter, 3 females (TAM); same except McAllen Valley Botanical Garden 1974, 1976, 1981, 1982, 1985, 3 males, 25 females (FDA); same except 23-25 Nov 1983, 1 male, 1 female (TAM); same except 18 Dec 1977, 1 female (TAM). PRESIDIO Co.: 17 Aug 1982, T. P. Friedlander, 1 female (TAM). Examined 7 males, 37 females.

## Key to North American Species of the C. maculata Species Group

1. Female, ninth abdominal sternite not visible ........................ 2
$1^{\prime}$. Male, ninth abdominal sternite visible ................................ 8
2(1). Frontal parietals ventrad of lateral ocelli with carinulae radiating from lateral margins of median ocellus straight, nearly lateral, terminating near margin of compound eye without curving ventrally to, or toward, level of antennal sockets (Figs. 2A; 2D; 2E; 2H)3
$2^{\prime}$. Frontal parietals ventrad of lateral ocelli with carinulae radiating from lateral margins of median ocellus oblique, appearing to curve ventrally to, or toward, level of antennal sockets before terminating (Figs. 2C; 2F; 2G)6
3(2). Metafemur with a ventromedial tooth ..... 4
3'. Metafemur without a ventromedial tooth ..... 5

4(3). Metaepisternum mostly covered with shallow to deep punctures; parapsidal furrows, median longitudinal stripe on mesoscutum and scutellum, mesopleural furrow, and dorsolateral spot or stripe on metacoxa, black

$4^{\prime}$. $\quad$| Metaepisternum mostly lacking punctures (smooth and shiny); pa- |
| :--- |
| rapsidal furrows, mesoscutum, scutellum, mesopleural furrow, and |
| metacoxa without black $\ldots . . \ldots . .$. igneopatruelis NEW SPECIES |


| 5(3'). | Propodeum with two posterolateral projections on either side of pet- <br> iole attachment, dorsal one robust and very prominent; bifurcated |
| ---: | :--- |
| apical areas of stigma unequal in length (Fig. 3A); gaster $1.66 \times$ |  |
| longer than metafemur; petiole $1.25 \times$ longer than high; basal |  |
| lamina of petiole $2.0 \times$, or less, longer ventrally than dorsally .. |  |

5'. Propodeum with a single, small, posterolateral propodeal projection on either side of petiole attachment; bifurcated apical areas of stigma equal in length (Fig. 3B); gaster $1.15 \times$ longer than metafemur; petiole $2.0 \times$ longer than high; basal lamina of petiole 3.0 $x$, or more, longer ventrally than dorsally . pilosipartis NEW SPECIES
$6\left(2^{\prime}\right)$. Petiole 0.8 to $0.9 \times$ as long as high; scape exceeding level of vertex by 0.2 to $0.25 \times$ its entire length; gaster 1.6 to $2.0 \times$ longer than metafemur mariae
6'. $\begin{aligned} & \text { Petiole longer than high; scape exceeding level of vertex by } 0.1 \times \text { its } \\ & \quad \text { entire length; gaster } 1.4 \times \text { longer than metafemur } \ldots \ldots \ldots . .7\end{aligned}$
$7\left(6^{\prime}\right)$. Petiole 1.125 to $1.25 \times$ longer than high; interocellar space $1.5 \times$ diameter of lateral ocellus; metacoxa usually with a dorsolateral black spot phais
$7^{\prime}$. Petiole 1.5, or more, $\times$ longer than high; interocellar space $2.0 \times$ diameter of lateral ocellus; metacoxa usually without black . . enocki
8(1'). Frontal parietals ventrad of lateral ocelli with carinulae radiating from lateral margins of median ocellus straight, nearly lateral, terminating near margin of compound eye without curving ventrally to, or toward, level of antennal sockets (Figs. 2A; 2D; 2E; 2H)9

8'. Frontal parietals ventrad of lateral ocelli with carinulae radiating from lateral margins of median ocellus oblique, appearing to curve ventrally to, or toward, level of antennal sockets before terminating (Figs. 2C; 2F; 2G)12

9(8). Metafemur with a ventromedial tooth ................................ . 10
9'. Metafemur without a ventromedial tooth ............................ . . 11
10(9). Antennal scape laterally protruded to an acute angle at apex (Fig. 1D); pedicel cylindrical (Fig. 1D); metaepisternum mostly punctured; frontogenal suture usually without a black stripe from base of mandible to ventral margin of compound eye ..........igneoides
10'. Antennal scape lateral margin rounded at apex (Fig. 1E); pedicel abruptly broadens at about 0.33 from base (Fig. IE); metaepisternum mostly lacking punctures (smooth and shiny); frontogenal suture always with a black stripe from base of mandible to ventral margin of compound eye ............. igneopatruelis NEW SPECIES
$11\left(9^{\prime}\right)$. Propodeum with two posterolateral projections on either side of petiole attachment, dorsal one robust and very prominent; bifurcated apical areas of stigma unequal in length (Fig. 3A); gaster equal in
length to metafemur; petiole $1.5 \times$ longer than high; basal lamina of petiole $2.0 \times$, or less, longer ventrally than dorsally . . . . acragae
11'. Propodeum with a single, small, posterolateral projection on either side of petiole attachment; bifurcated apical areas of stigma equal in length (Fig. 3B); gaster about $0.85 \times$ as long as metafemur; petiole $2.0 \times$ longer than high; basal lamina of petiole $3.0 \times$, or more, longer ventrally than dorsally . . . pilosipartis NEW SPECIES
$12\left(8^{\prime}\right)$. Pedicel triangular (Fig. 1F); antennal scape with lateral margin protruded to an acute angle at apex (Fig. 1F) ..................... mariae
12'. Pedicel cylindrical; antennal scape with lateral margin rounded at apex

13
13(12'). Antennal scape frontally very broad and deeply excavated at apex,
mesal margin sinuous near apex (Fig. 1G) ...............................
13'. Antennal scape frontally narrow, only slightly swollen and slightly excavated at apex, mesal margin nearly straight near apex (Fig. 1C)
enocki

## Conura immaculata Species Group Conura dentiscapa Moitoza, NEW SPECIES

 (Figs. 1B; 2B)Types. - HOLOTYPE (male): CALIFORNIA. SAN BERNARDINO Co.: Apple Valley, 26 Mar 1959, N. MacFarland. ALLOTYPE (female): same except, Victorville, 28 Sep 1956, Timberlake. Holotype and allotype deposited in the U.S. National Museum of Natural History, Washington, D.C.

Description. - Male (holotype). Body length. 3.5 mm . Color. Yellow, with black, light orange, brownorange, and brown; ventrolateral teeth of metafemur, arcuate ventrolateral stripe of metatibia, black; occiput, anterior area of protergum, posterior margin of pronotum, mesal area of mesoscutum, transscutal suture, dorsolateral surface of metacoxa, apical spot on metafemur, light orange; petiole, most of gaster, brown-orange; mandibular teeth, spot around stigma, brown. Head. Antennal scape narrow from base to apex, 0.15 of length exceeding vertex, small mesal denticle near apex (Fig. 1B); head 0.1 wider than widest point of thorax (excluding tegulae); interocellar space mesally depressed, $2.0 \times$ diameter lateral ocellus; vertex with short, sparse, reddish setae; frontal parietal ventrad of lateral ocellus coriaceo-reticulate, with shallow, broad punctures, short, reddish setae; scrobe cavity shallow, smooth, with marginal carinae ventrad of antennal sockets; interantennal projection with small anterior carina; interocular space at level of ventral margin of median ocellus $2.25 \times$ maximum frontal width of compound eye; frontotentorial pits small, ventrad and laterad of antennal socket; frons dorsad of scrobe cavity and ventrad of antennal socket coriaceo-reticulate, with short, reclined, silver setae; frontogenal suture obscure, ventral half incomplete; malar space $0.5 \times$ height of compound eye; gena, posterior parietals minutely reticulate. Thorax. Pronotum anterolateral margin with small lamina; pronotum and mesoscutum punctured, with short, sparse, red, reclined setae; parapsides and scutellum with larger punctures, red, sparse setae reclined on parapsides and erect on scutellum; mesoepimeron transversely rugose; metaepisternum with large scattered punctures, short, sparse, erect, silver setae dorsally and laterally; metacoxa dorsolateral surface glabrous, medial surface minutely reticulate, with short, silver setae; metafemur shagreened, minutely punctured, with very short, sparse, silver setae, ventrolateral margin with numerous short teeth, ventromedial tooth small and acute; stigma triangular. Abdomen. Propodeum basally coriarious, rugose, posterior carinae forming polygonal shapes, few short, erect, silver setae protruding from apex of propodeum on either side of petiole attachment; propodeal posterolateral tooth-like projections short, obtuse, on either side of petiole attachment; petiole granulate, ventrally rugose, $4.0 \times$ longer than high, lateral carinae lacking; basal lamina short, ventrally round, dorsally square; flange angle inclined 30 degrees from vertical when viewed laterally. Gaster mostly smooth, short and blunt, $0.75 \times$ length of metafemur, height $0.9 \times$ length.

Feriale (Allotype). - Body length. 4 mm . Head. Antennal scape with 0.1 of length exceeding vertex,
lacking mesal denticle near apex; frontogenal suture straight, faint. Abdomen. Petiole length $3.0 \times$ height; gaster length $0.9 \times$ metafemur.

Diagnosis. - Bearing a large ( $50 \%$ the height of a compound eye) malar space, and an obscure frontogenal suture, this new species seems closely related to Burks's Conura side species group. The large malar space produces the triangular-shaped head C. dentiscapa shares with the Conura side species group members. Mr. Delvare has assigned specimens of C. dentiscapa to the C. immaculata species group (G. Delvare, personal communication). The tiny mesal denticle near the apex of the scape is the male's most distinguishing feature.

Etymology.-From the Latin word dentiscapa, meaning toothed scape. The name describes the small apical tooth on the male antennal scape.

> Material Examined. -Holotype, allotype.

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## Literature Cited

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Walker, F. 1860. Characters of undescribed species of the family Chalcidae. Jour. Entomol., 1: 172184.


[^0]:    ${ }^{1} 2137$ South Twelfth Street

[^1]:    Material Examined.-ALABAMA. LAUDERDALE Co.: Elgin (UK). ARIZONA. APACHE Co.: Egar (NCSU, UA); Vernon (UA). COCHISE Co.: (CAS, CDFA, FDA, UCR); Cave Creek Canyon (Hesp); Charleston (UA); 8 km ( 5 mi ) W of Portal, $1646 \mathrm{~m}(5400 \mathrm{ft}$ ) (UA). COCONINO Co.: Oak Creek Canyon (LACM). PIMA Co.: $16.2 \mathrm{~km}(10 \mathrm{mi}) \mathrm{E}$ of Sonoita (AMNH); Santa Catalina Mts, Sabino Creek Sta. (UA); and Tucson (CAS). SANTA CRUZ Co.: (USU). CALIFORNIA. AMADOR Co.: Ione (UK). EL DORADO Co.: (TAM). IMPERIAL Co.: Bard, in cotton (CDFA). LOS ANGELES Co.: (CDFA). ORANGE Co.: Irvine (LACM). PLACER Co.: (CDFA). RIVERSIDE Co.: (LACM, UCR); S of Blackhill (Hesp). SAN DIEGO Co.: (CAS); Warner Springs, 945 km ( 3100 ft ) (CDFA). SANTA CLARA Co.: (LACM). SHASTA Co.: (CAS). TULARE Co.: (CAS). TUOLEMNE Co.: Sonora (UK). FLORIDA. ALACHUA Co.: Gainesville (FDA); Austin Grey Forest (FDA); Montoeca (FDA). BAKER and COLUMBIA Co. line: Oceola Natl Forest (FDA). COLUMBIA Co.: Lake City (UK). DADE Co.: (UG). DUVAL Co.: Jacksonville (AMNH). ESCAMBIA Co.: Riverview (UG). GADSDEN Co.: Quincy, in soybeans (FDA). HIGHLANDS Co.: Archbold Biol Sta (FDA). HILLSBOROUGH

[^2]:    Description. - Female (holotype). Body length. 6.0 mm . Color. Yellow, with black, brown-orange, and brown; mandibular teeth, ventrolateral metafemoral teeth, arcuate ventrolateral stripe of metatibia, ovipositor sheath, black; area ventrad of lateral ocellus, occiput (slightly), frontal area of protergum, mesal area of mesoscutum, parapsides, mesal stripe of scutellum, proximal area of metatibia, brownorange; antennal flagellum, pretarsi, spot around stigma, gaster, dark brown. Head. Antennal scape with 0.15 of length exceeding vertex; interocellar space mesally depressed, $1.5 \times$ diameter of lateral ocellus; vertex with erect, sparse, short, red-brown setae; frontal parietal ventrad of lateral ocellus with carinulae radiating from lateral side of median ocellus straight, nearly lateral, terminating near margin of compound eye, not curving ventrally to level of antennal socket; scrobe cavity shallow, smooth, shiny, with small marginal carinae ventrad and laterad of antennal sockets; interantennal projection with small anterior carina; interocular space at level of ventral margin of median ocellus $1.8 \times$ maximum frontal width of compound eye; frons below antennal socket smooth, shiny, with short, sparse, red-brown setae; frontotentorial pit laterad and on level of ventral margin of antennal socket;

[^3]:    Material Examined.-ALABAMA. MOBILE Co.: Dauphin Islands (MSU). ARIZONA. COCHISE Co.: Chiricahua Mts, Cave Creek Canyon (Hesp). MARICOPA Co.: Phoenix (UA); Scottsdale (UA). PIMA Co.: Rosemont (UA); Saguaro National Monument, spring 1960, J. D. Butler, Hemileuca tricolor (Packard), 5 males, 16 females (UA); Santa Catalina Mts (UA); Santa Rita Extension Range, 10-19 Oct 1978, Agapema galbina (Clemens), 2 males, 1 female (UA); Tucson, Jun 1966, J. Hessel, Oiketicus toumeyi Jones, 6 females (UA). ARKANSAS. JOHNSON Co.: (MSU). CALIFORNIA. ALAMEDA Co.: Livermore Hills, Cedar Mountain, 21 May 1951, J. R. Heller, Samia sp., 2 males, 14 females (CAS). CONTRA COSTA Co.: Mount Diablo, 610 m (2000 ft) (CAS). TULARE Co.: Kernville (UK). TUOLUMNE Co.: Tuolumne (CDFA). FLORIDA. ALACHUA Co.: (FDA). DADE Co.: (FDA). HIGHLANDS Co.: Archbold Biological Station (FDA). INDIAN RIVER Co.: (FDA). LIBERTY Co.: (FDA); Feb, G. R. Night, Antheraea polyphemus (Cramer), 1 male, 1 female (LACM). GEORGIA. FULTON and/or DE KALB Co.: Atlanta (UG). CLARK Co.: (UG). LIBERTY Co.: St Catherine's Island (UG). KANSAS. DOUGLAS Co.: (UK). LOUISIANA. E BATON ROUGE PARISH: 14 Feb 1966, J. E. Eger, A. polyphemus, 4 males, 1 female (LACM). NATCHITOCHES PARISH: (LSU). MASSACHUSETTS. SUFFOLK Co.: Forest Hills (LACM). MISSISSIPPI. ADAMS Co.: Natchez State Park (MSU). OKTIBBEHA Co.: Starkville, 6 Feb 1986, A. Aszuith, tachinid pupae, 6 females (MSU); Craig Springs (MSU). WIGGINS Co.: Wiggins, 30 Jul 1921, J. P. Kislanko, Actias luna (L.), 11 males, 4 females (MSU). NEW JERSEY. PASSAIC Co.: Patterson (AMNH). NEW MEXICO. COLFAX-MORA Co.: Oct 1979, Hemileuca oliviae Cockerell, 2 females (NMSU). GRANT Co.: (LACM). NEW YORK. KINGS Co.: Brooklyn (AMNH). ONONDAGA Co.: Syracuse (UA). COUNTY UNKNOWN: Long Island, Callosamia promethea (Drury), 1 male (AMNH); New York City, Thyridopteryx ephemeraeformis (Haworth), 1 male (AMNH). NORTH CAROLINA. CUMBERLAND Co.: Fort Bragg (CAS). GASTON Co.: Gastonia, 3-4 May 1938, R. M. Mckenzie, Hyalophora cecropia (L.), 3 females (LACM). NASH Co.: (NCSU). WAKE Co.: (NCSU); Raleigh (NCSU). OHIO. SUMMIT Co.: 6 Apr 1937, L. J. Lipovsky, C. promethea, 5 males, 10 females (UK). OKLAHOMA. BEAVER Co.: Beaver State Park (OSU). MCCURTAIN Co.: Wright City (OSU). PAYNE Co.: Lake Carl Blackwell (OSU), Stillwater (OSU). STEPHENS Co.: (OSU). TULSA Co.: (OSU). SOUTH CAROLINA. PICKENS Co.: Clemson (FDA). GREENVILLE Co.: Greenville, 1966, R. S. Peigler, Callosamia angulifera (Walker), 1 female, (LACM). LEXINGTON and/or RICHLAND Co.: Columbia, 5 May 1945, S. S. Nicolay, C. promethea, 11 females (LACM). TEXAS. ANDERSON Co.: Salmon (TAM). BRAZOS Co.: College Station, 31 Aug 1979, T. J. Kring, T. ephemeraeformis, 1 female (LACM). CAMERON Co.: Cameron (UG). HIDALGO Co.: Feb 1980, C. W. Agnew \& J. E. Eger, Rothschildia forbesi Benjamin, 20 males, 26 females (LACM). SAN PATRICIO Co.: Welder Wildlife Refuge, mesquite chaparral (UG). VICTORIA Co.: Victoria (LACM). Examined 193 males, 315 females.

